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ABSTRACT

A national sample of 134 vocational educators, representing 6 vocational disciplines (agriculture, business, home economics, marketing and distribution, trade and industrial, and health occupations education), was surveyed to ascertain the relative importance of 47 competencies for applying microcomputers in vocational education. The 12-member DACUM (Developing A CurriculUM) panel that generated the core of this competency profile was used as a comparison group in this investigation. A one-way ANOVA (analysis of variance) procedure was used to determine if significant differences occurred between the groups' importance ratings on the five categories into which the competencies were grouped and their respective competencies. T-tests were used to identify which groups differed significantly. The groups' ratings did not differ on the categories; however, there were significant differences on 5 of the 47 competencies: (1) define the instructor's role in computer-based instruction (CBI); (2) demonstrate an awareness of microcomputer software; (3) assess students' needs for CBI applications; (4) orient students to CBI; and (5) assess students' microcomputer skills. Health, business, and marketing and distribution educators placed the highest level of importance on the five competencies, while home economics, agriculture, and trade and industrial instructors placed the least importance on them. This finding may reflect a split between high-technology and low-technology areas of the curriculum. Mastery of the content related to the 47 competencies can provide vocational teachers with opportunities to apply emerging technologies to the pursuit of excellence in curriculum, instruction, and the advancement of students from school to work. (Author/KC)

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A Comparison of the Importance of Competencies for Applying Microcomputers in Vocational Education

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Abstract

A national sample including 134 vocational educators, representing 6 vocational disciplines, was surveyed to ascertain the relative importance of 47 competencies for applying microcomputers in vocational education. The 12-member DACUM panel that generated the core of this competency profile was used as a comparison group in this investigation. A oneway ANOVA procedure was used to determine if significant differences ($p \leq .05$) occurred between the groups' importance ratings on the 5 categories and their respective competencies. T-tests were used to identify which groups differed significantly. The groups' ratings did not differ on the categories; however, there were significant differences on 5 of the competencies.

A Comparison of the Importance of Competencies for Applying Microcomputers in Vocational Education

Vocational instructors have always had to cope with the dilemma of working with technology that is in a constant state of flux (Skaine, 1985). Furthermore, vocational educators have always had the responsibility of preparing students for a world of work that is constantly changing. These concerns serve as a reminder to vocational teachers that they do not have the luxury of resting on previously learned work skills and knowledges. Vocational educators must keep abreast of contemporary developments within their vocational area of expertise (Skinkle, 1981).

This concern for technical updating is not limited to industrial applications of technology (Roth & Tesolowski, 1985, October). In addition to concerns about preparing students for changing workplaces, vocational teachers must contend with the application of new instructional developments. Educators could be experiencing the most significant technological change in the history of education. The microcomputer has created the greatest challenge ever for vocational instructors. The rapid influx of microcomputers into vocational classrooms and laboratories has caught many vocational educators unprepared to effectively utilize this contemporary instructional technology.

As educational systems continue to acquire computer technology, many vocational instructors are saying, or at least thinking, "Where do we start with these machines?" Microcomputers are often purchased for vocational programs which are staffed by personnel that have not been appropriately trained to utilize the technology. These vocational instructors may have been trained in the era before computers. Subsequently, their knowledge of computer hardware and software may be limited. This unfortunate situation is often all too real. A potential resulting danger is that the microcomputer, a technological device that holds unlimited promise for education, could be misused or not used at all

simply because of a lack of adequate support for instructors at the grassroots level (Pratscher, 1983, April/May).

Vocational teachers are currently faced with the problem of how to apply computer technology in their classrooms and laboratories (Roth & Tesolowski, 1985). A major part of this problem is not so much a function of using computer systems, but how to apply them in an educational setting. In conjunction with these concerns, this investigation, which was jointly sponsored by the Illinois State Board of Education, Department of Adult, Vocational and Technical Education and the Idaho State Board of Vocational Education, Division of Vocational Education, served to identify differential values in relationship to the importance of competencies associated with applying microcomputers in six vocational program areas (Roth & Tesolowski, 1984; Roth, Tesolowski, Rankin, & Blackman, 1984, April).

The Need for Identifying Professional Education Competencies for Vocational Educators

Personnel in vocational education have the responsibility of providing instruction that will facilitate students' growth through the attainment of occupational competencies. Since our profession emphasizes learning through performance, the need for professional education competency development can not be overemphasized in preservice teacher education programs and inservice staff development activities for vocational educators (Rawls & Fatunsin, 1985).

The overall need for an objective base of performance requirements or competencies for vocational teachers has been established (Burrow & Groneman, 1976, 1978; Potter, 1973). Potter indicated that performance or competency-based education is dependent upon the assumption that a causal relationship exists between teacher behavior and specifically identified outcomes.

A comprehensive competency identification and validation study was conducted at the National Center for Research in Vocational Education

(Cotrell, Chase, & Molnar, 1972). The study used occupational analysis, verification, and a critical incident survey to identify 384 professional education competencies. These statements were refined through introspection and interviews and the resulting 100 were included in the following areas on the vocational teacher competency profile: program planning, development, and evaluation; instructional planning; execution of instruction; instructional evaluation; management of instruction; guidance; school-community relations; student vocational organization; professional role and development; and coordination of cooperative education (Performance Based Curricula Program, 1975).

As the concern for accountability, excellence in education, and quality teachers mounts, the need to ascertain and refine competencies continues to escalate (Rawls & Fatunsin, 1985). This need may be one of the most important tasks facing professionals in vocational education (Tulloch, 1978, October).

Categories and Competencies Included on the VOCATIONAL TEACHER COMPETENCY PROFILE FOR MICROCOMPUTER APPLICATIONS

The DACUM (Developing A CurriculUM) process (Adams, 1975) was utilized in an earlier investigation to identify competencies that are needed by vocational educators to apply microcomputers in their programs (Roth & Tesolowski 1984; Roth & Tesolowski, 1985; Roth, Tesolowski, Rankin, & Blackman, 1984, April; Tesolowski & Roth, manuscript being reviewed). The technique was used on the basis of the strength of the following three assumptions: (a) expert workers can define and describe their job more accurately than anyone else; (b) any job can be effectively described in terms of the tasks that successful workers in that occupation perform; and (c) all tasks, in order to be performed correctly, demand certain knowledges and attitudes from workers (Miller-Beach, 1980, April). Furthermore, the DACUM process has credibility as a procedure that can be used to identify worker tasks or competencies in a manner similar to occupational analysis, it can be conducted in a relatively short period of time, and it is a fairly inexpensive method (Norton, 1985).

Definition of Categories and Competencies

The terms "category" and "competency" are used synonymously with the respective terms "duty" and "task" in this study (Blank, 1982). Categories have been defined as a distinct, major work segment in an occupation. Varying numbers of sequentially-related competencies can be included within each category. Competencies have been defined as specific work-related activities. Each competency has a direct implication for the knowledge and attitude that vocational educators perform in completing the competency as well as its inclusive category (Andreyka, no date).

Categories and competencies which were identified through the DACUM process in the earlier investigation were intended to demonstrate cognitive, affective, and psychomotor capabilities (Finch & Crunkilton, 1984) which are important to vocational educators in applying microcomputers in their programs. Competencies represent specific behaviors which can be integrated into a vocational educator's repertoire in order to partially fulfill the intent of each respective category (Tesolowski & Roth, manuscript being reviewed).

Content of the Microcomputer Competency Profile

The DACUM process resulted in the compilation of 47 competencies clustered within the following 5 categories on the VOCATIONAL TEACHER COMPETENCY PROFILE FOR MICROCOMPUTER APPLICATIONS (Table 1):

A - Developing a Personal Plan for Microcomputer Competency (8 competencies);

B - Integrating Computer Based Instruction (CBI) into Vocational Curricula (8 competencies);

C - Planning, Executing, and Evaluating CBI (14 competencies);

D - Planning and Organizing the Vocational Education Learning Environment for CBI (7 competencies); and

E - Performing Classroom Management Functions with CBI (10 competencies).

The importance of the 5 categories and the 47 competencies has been established (Tesolowski & Roth, manuscript being reviewed.) Vocational educators have indicated that all of the categories and competencies are important. Mean importance ratings for the 47 competencies range from 3.38 to 4.61. The five categories, which contain these competencies, have a range of mean importance ratings from 3.74 to 4.18. The overall average rating of each individual competency and each category is 3.99. This competency profile may simply be referred to as the profile throughout this manuscript.

Insert Table 1 about here

Purpose of the Study

The purpose of this investigation was to determine if differential values exist in relationship to the importance of competencies associated with applying microcomputers between members of the original DACUM panel and professionals in the following six vocational program areas: agriculture; business; home economics; marketing and distribution; trade and industrial; and health occupations education. Specific objectives of this study were to: (a) determine whether the groups surveyed perceived any of the five categories of competencies to be of significantly greater ($p \leq .05$) importance than the others on the VOCATIONAL TEACHER COMPETENCY PROFILE FOR MICROCOMPUTER APPLICATIONS; and to (b) ascertain whether significant group differences ($p \leq .05$) occurred for any of the individual competencies on the profile.

Method

The research procedure was designed to permit a more indepth analysis of the original importance ratings for the categories and competencies on the profile in Table 1. The methodology was planned to ascertain whether or not professionals in various vocational disciplines as well as the members of the original DACUM panel differed in their perceptions about the importance of these categories and competencies.

Selection of the Sample

A preliminary survey was conducted in order to identify the sample for this investigation. State supervisors or coordinators representing six vocational disciplines were sent a mail survey and asked to identify a teacher with expertise at applying the microcomputer in their respective discipline. Respondents to this preliminary survey identified a total of 134 vocational educators that met the criteria.

The total sample surveyed in order to determine the importance ratings for the 47 competencies included these 134 professionals. In addition, the 12 members of the DACUM panel were also surveyed. All 12 members were from Illinois and they included 4 secondary vocational instructors, 4 postsecondary vocational instructors, 3 secondary vocational administrators, and 1 representative of the Illinois Department of Adult, Vocational and Technical Education. In addition to being practitioners in the field of vocational education, these individuals had been recognized as leaders in the state of Illinois at applying microcomputers in their work. The panel members represented the following vocational areas: agricultural occupations; business, marketing and management occupations; home economics occupations; health occupations, industrial occupations; and vocational special needs education.

After a second mailing to nonrespondents, a total of 97 vocational instructors (72%) and 11 members of the DACUM panel (92%) responded. The number and percentage of respondents from each group and the DACUM panel are presented in Table 2.

Insert Table 2 about here

Instrumentation

A professionally printed copy of the VOCATIONAL TEACHER COMPETENCY PROFILE FOR MICROCOMPUTER APPLICATIONS (see Table 1) was used in the mail survey to collect importance ratings for the 47 competencies. The information block in

the lower right-hand corner of the profile contained explicit instructions regarding the rating procedures which were to be used in the study.

Statement of the Null Hypotheses

The null hypotheses which were tested in this study were:

HO_1 There are no significant differences between the importance ratings of the groups of the sample surveyed for the five individual categories on the profile.

HO_2 There are no significant differences between the importance ratings of the groups of the sample surveyed for the 47 individual competencies on the profile.

The hypotheses were tested at the .05 level of significance

Research Procedure

The VOCATIONAL TEACHER COMPETENCY PROFILE FOR MICROCOMPUTER APPLICATIONS was mailed along with a transmittal letter to the sample population. Provisions were made for a follow-up mailing, which was conducted with nonrespondents. Members of the sample were requested to rate each competency using the following 5-point Likert-type scale: 1 = No Importance; 2 = Minimal Importance; 3 = Average Importance; 4 = High Importance; and 5 = Extreme Importance.

Data gathered from the returned profiles was tabulated and input to the computer. Group means were then computed for the 7 groups on each of the 5 categories and 47 competencies.

Potential group differences ($p \leq .05$) on the categories and competencies were ascertained by applying oneway analysis of variance (ANOVA) to the data. If a significant group difference was evidenced, then a t-test was used for each pair of groups to determine which groups differed at the .05 level (Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975).

Results

Findings of the national survey indicated that the 7 groups did not differ ($p \leq .05$) on any of 5 categories of the profile. However, significant group differences were evidenced on 5 of the 47 competencies at the .05 level. Therefore, null hypothesis 1 was accepted and null hypothesis 2 was rejected.

Results of the ANOVA procedure for the five competencies on which the groups differed significantly are presented in Table 3. The five competencies

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Insert Table 3 about here

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which the groups differed on are listed in Table 4 along with the groups' means and standard deviations. The greatest group differences are reflected by the

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Insert Table 4 about here

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range of means from 4.86 to 3.56 on competency A.2 (Define the Vocational Instructor's Role in the LEA Plan for CBI). Competency C.2 (Assess Students' Needs for Specific CBI Applications) was represented by the second greatest range of means from 4.86 to 3.67. The third greatest range of means was 4.64 to 3.50 for competency B.4 (Demonstrate an Awareness of Microcomputer Software for Developing Computer Based Vocational Curricula). Competency C.12 (Assess Student Microcomputer Skills) had a range of means from 4.40 to 3.33 and competency C.9 (Orient Students to CBI) had the smallest range of means from 4.65 to 3.67.

In order to determine which groups actually differed with each other ($p \leq .05$), a t-test was applied to each set of paired groups for competencies A.2, B.4, C.2, C.9 and C.12. The results of the t-tests for pairs of groups that differed significantly are presented in Table 5. Eighteen pairs of groups

Insert Table 5 about here

differed significantly on the five competencies. There were 5, 3, 3, 4 and 3 sets of paired group differences respectively on competencies A.2, B.4, C.2, C.9, and C.12. Pairs of groups that differed on each of these competencies are listed in Table 6. The 7 groups included in the sampled population differed a total of 18 times on the 5 competencies. The following numbers indicate how many times each of the participating groups differed: trade and industrial (12); agriculture (7);

Insert Table 6 about here

business (5); health (5); marketing and distribution (3); home economics (2); and the DACUM panel (2).

Discussion

This investigation was undertaken in order to ascertain whether various vocational disciplines and the DACUM panel that generated the VOCATIONAL TEACHER COMPETENCY PROFILE FOR MICROCOMPUTER APPLICATIONS differed in their perceptions of the importance of the categories and competencies on the profile. Results of the study indicated that the groups in the sampled population did not view the categories of competencies differently. However, the 7 groups did differ significantly ($p \leq .05$) in their perceptions of the importance of 5 of the 47 competencies.

Differential Group Values Associated with the Importance of Five Competencies

Five of the 47 competencies included on the profile were viewed significantly different by the groups in the sampled population. These competencies included A.2, B.4, C.2, C.9, and C.12.

Competency A.2 - Define the Vocational Instructor's Role in the LEA Plan for CBI. The greatest level of disagreement was associated with the importance of this competency. Every group except trade and industrial educators was involved in these differences. The agriculture and health groups were each involved in three of these group differences. Apparently vocational educators differ in the way that they view their personal involvement in the local education agencies' plan for computer based instruction. Health occupations instructors placed the highest level of merit on this competency and gave it an average importance rating of 4.86. Conversely, teachers in agriculture gave this competency the lowest importance rating (M = 3.56).

Competency B.4 - Demonstrate an Awareness of Microcomputer Software for Developing Computer Based Vocational Curricula. Trade and industrial (T&I) educators were involved in each of the three group differences on this competency. T&I instructors gave this competency a relatively low average importance rating of 3.50. The range of means for the other six groups on this competency was 4.09 to 4.64. Educators in agriculture (M = 4.28), business (M = 4.40), and home economics (M = 4.64) differed significantly with T&I teachers on the importance of this competency.

Competency C.2 - Assess Students' Needs for Specific CBI Applications. Educators in health and T&I occupations represented the extremes in regards to the importance of this competency. These two groups respectively associated the highest level of importance (M = 4.86) the the lowest level of importance (M = 3.67) with the process of assessing students' needs for specific CBI applications. The only other two groups involved in the differences included agriculture on the lower end of the level of importance and business on the higher end.

Competency C.9 - Orient Students to CBI. The second greatest level of disagreement was associated with this competency. Trade and industrial educators

were involved in each of the four sets of paired group differences. T&I instructors rated the importance of this competency as 3.67, meanwhile on the high end of the importance ratings marketing and distribution, agriculture, the DACUM panel, and business respectively rated the importance as 4.65, 4.56, 4.54 and 4.53. These ratings seem to indicate that T&I educators are the only group that do not feel it is necessary to orient their students to computer based instruction.

Competency C.12 - Assess Student Microcomputer Skills. Educators in marketing and distribution (M&D) and T&I occupations respectively rated the importance of this competency highest (M = 4.40) and lowest (M = 3.33). Two other groups associating a fairly high level of importance with this competency were business (M = 4.27) and health (M = 4.14).

Disciplines in Vocational Education Vary in their Perceptions of the Importance of Five Competencies

Several important considerations become evident upon reviewing which groups differed on competencies A.2, B.4, C.2, C.9, and C.12 and which groups associated the highest and lowest level of importance with these competencies.

Trade and industrial. As previously indicated, T&I educators were involved in 12 of the 18 pairs of group differences. These instructors rated the importance of competencies B.4, C.2, C.9, and C.12 lower than any of the other groups. They were not involved in the paired group differences for competency A.2 (Define the Vocational Instructor's Role in the LEA Plan for CBI) and appear to feel that this competency is relatively important.

Agriculture. Educators included in this group were involved in 7 of the 18 pairs of group differences. These instructors' ratings indicated that this group associated the least importance of all groups with competency A.2. Furthermore, they associate a fairly low level of importance, but not lower than T&I, with

competency C.2 (Assess Students' Needs for Specific CBI Applications). These agricultural occupations educators associated a relatively high level of importance with competencies C.9, B.4, and C.12.

Health. Health occupations educators were involved in 5 of the 18 pairs of group differences. Their involvement in these paired group differences was limited to competencies A.2 and C.2. Members of this group rated the importance of both of these competencies higher than any of the other groups. Futhermore, these health instructors rated the other three competencies relatively high.

Business. Educators included in this group were involved in 5 of the 18 pairs of group differences. However, it should be noted that their involvement in these paired group differences was scattered across all 5 of the competencies. In addition, all of their ratings represented a high level of importance with regards to the competencies that they differed on. Business occupations educators consistently rated the importance of these competencies high, but they did not rate any one of the competencies higher than all of the other groups.

Marketing and distribution. Instructors in this group were involved in 3 of the 18 pairs of group differences. Their ratings represented the higher level of importance in each of the paired group differences on competencies A.2, C.9, and C.12. M&D educators differed with instructors in agriculture on A.2 and T&I educators on C.9 and C.12. Members of this group rated the importance of competencies C.9 (Orient Students to CBI) (M=4.65) and C.12 (Assess Student Microcomputer Skills) (M=4.40) higher than any of the other groups.

Home Economics. Educators included in this group were involved in 2 of the 18 pairs of group differences. Home economics (HE) instructors differed with the extremely high importance rating (M=4.86) that health occupations educators gave to competency A.2. This difference occurred in spite of the fact that educators in HE gave this competency the second highest (M=4.33) importance rating compared to the

other groups. Members of the HE group rated the importance of competency B.4 (Demonstrate an Awareness of Microcomputer Software for Developing Computer Based Vocational Curricula) higher ($\underline{M}$=4.64) than any of the other groups and they differed with T&I instructors ($\underline{M}$=3.50) in regards to the importance of this competency.

DACUM. Members of the original DACUM panel that created the foundation or core of the VOCATIONAL TEACHER COMPETENCY PROFILE FOR MICROCOMPUTER APPLICATIONS were involved in 2 of the 18 pairs of group differences. Professionals included on the DACUM panel differed with health occupations educators on competency A.2. These two groups respectively rated the importance of this competency as 3.91 and 4.86. Members of the DACUM panel ($\underline{M}$=4.54) also differed with T&I instructors ($\underline{M}$=3.67) in regards to the importance of competency C.9 (Orient Students to CBI). The DACUM panel members did not rate the importance of any of these five competencies higher or lower than all of the other groups.

Potential Causes of the Differential Values Associated with the Perceived Importance of these Five Competencies

The underlying reasons which caused members of these six vocational program areas to express differential values associated with the importance of these five competencies can only be surmised. An explanation of these differential values could be conjectured related to following possible causes:

1. Resources have not been committed for the acquisition of microcomputer hardware and software.
2. Software related to specific vocational disciplines is not readily available.
3. Educators were trained before the computer era, which has resulted in differential levels of computer literacy.

Summary, Conclusions, and Implications

A national sample including 134 vocational educators, representing six vocational disciplines, was surveyed to ascertain the relative importance of 5

categories and the 47 competencies included within them for applying microcomputers in vocational education. The 12-member DACUM panel that generated the foundation or core of this competency profile was used as a comparison group in the study. A oneway ANOVA procedure was used to determine if significant differences ($p \leq .05$) occurred between the groups' importance ratings on the five categories and their respective competencies. T-tests were utilized to identify which groups differed significantly. The groups' ratings did not differ on any of the five categories. However, significant differences did occur on competencies A.2, B.4, C.2, C.9, and C.12.

Each of the 47 competencies included on the profile have been determined to be important to vocational educators in regards to applying microcomputers in their programs (Tesolowski & Roth, manuscript being reviewed). However, as reported in the results of this investigation, it must be noted that disciplines in vocational education differ significantly in their perceptions of the importance of five of these competencies. Contrarily, of even greater importance, it must be observed that these seven groups of professional vocational educators did not differ significantly on 42 of these competencies.

The overall value or magnitude of importance that the seven surveyed groups placed on the five competencies, on which they differed, is represented by the following order (highest to lowest level of importance): health, business, marketing and distribution, the DACUM panel, home economics, agriculture, and trade and industrial. Interestingly, the DACUM panel is located directly in the middle of the seven groups. The members of this panel seem to have been more consistent in the values that they placed on the importance of these five competencies.

Of even greater concern, the issue of high technology versus low technology industries must be considered. Health, business, and marketing and distribution occupations educators respectively placed the highest level of importance on these five competencies. Meanwhile, home economics, agriculture, and trade and industrial occupations instructors respectively placed the least importance on them. The

position of these six vocational disciplines, in regards to the importance of these five competencies, may motivate professionals across all programmatic areas of vocational education to be concerned about the answer to the following question: Has the transition to technology created the need for a panoply of new skills and made many old basic skills obsolete (Derringer, 1983, September)? If the answer to this question is affirmative, then vocational education instructors must ensure that emerging technological skills are being adequately reflected in their curricula and instructional methodologies (Roth & Tesolowski, in press).

The infusion of computer technology and educational computing into vocational curricula and instruction will continue to be one of the greatest challenges facing vocational educators. Mastery of content related to the 47 competencies on the VOCATIONAL TEACHER COMPETENCY PROFILE FOR MICROCOMPUTER APPLICATIONS can provide vocational instructors with opportunities to apply emerging technologies to the pursuit of excellence in curriculum, instruction, and the advancement of students from school to work.

Every vocational discipline will be affected by the continued expansion of computer technology. Vocational education curricula must be tailored to assist students in meeting present needs, as well as future employment demands. Vocational instructors must be prepared to educate students for a world of work that is constantly changing. As technological innovations alter workers' responsibilities, students who have participated in vocational programs will be required to change, develop, and remain employable in a computer based workforce (Montana Task Force, 1983).

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Table 1

Mean Competency Ratings for Categories and Competencies on the

VOCATIONAL TEACHER COMPETENCY PROFILE FOR MICROCOMPUTER APPLICATIONS

Category	Competencies							
A Developing a Personal Plan for Microcomputer Competency — 3.97	A.1 Define Elements of a Local Education Agency (LEA) Plan for Computer Based Instruction (CBI) — 3.67	A.2 Define the Vocational Instructor's Role in the LEA Plan for CBI — 4.00	A.3 Conduct a Personal Assessment of Microcomputer Competency — 3.90	A.4 Set Personal Goals for Microcomputer Competency — 4.11	A.5 Construct a Personal Plan for Microcomputer Competency — 4.06	A.6 Implement a Personal Plan for Microcomputer Competency — 4.16	A.7 Evaluate Personal Plan Based on Computer Innovations — 3.87	A.8 Modify Personal Plan as Needed — 3.97
B Integrating CBI into Vocational Curricula — 4.18	B.1 Identify Job-Specific Applications of Microcomputers for Inclusion in Vocational Curricula — 4.42	B.2 Identify Educational Applications of Microcomputers for Inclusion in Vocational Curricula — 4.37	B.3 Develop a Plan to Apply CBI to Vocational Curricula — 4.38	B.4 Demonstrate an Awareness of Microcomputer Software for Developing Computer Based Vocational Curricula — 4.22	B.5 Write Specifications for Hardware/Software Based on Vocational Curricula Requirements — 3.77	B.6 Implement a Plan to Apply CBI to Vocational Curricula — 4.26	B.7 Evaluate Applications of CBI in Vocational Curricula Based on Innovation in Computer Technology & Work — 3.95	B.8 Modify Applications of CBI in Vocational Curricula as Needed — 4.04
C Planning, Executing & Evaluating CBI — 4.09	C.1 Differentiate Among Applications of CBI (Such as Drill & Practice, Tutorial, Simulation & Problem Solving) — 3.84	C.2 Assess Students' Needs for Specific CBI Applications — 4.15	C.3 Develop Lesson Plans Incorporating CBI — 4.22	C.4 Select Appropriate Software for Specific Instructional Purposes — 4.61	C.5 Modify Simple Software for Specific Instructional Purposes — 3.71	C.6 Develop Software for Specific Instructional Purposes — 3.38	C.7 Prepare Instructional Materials to Accompany Software — 4.22	C.8 Modify Software Documentation for Specific Instructional Purposes — 3.77
Planning, Executing & Evaluating CBI (Con't)	C.9 Orient Students to CBI — 4.43	C.10 Execute CBI — 4.39	C.11 Individualize Instruction with CBI — 4.17	C.12 Assess Student Microcomputer Skills — 4.02	C.13 Evaluate Effectiveness of CBI Based on Student Achievement — 4.21	C.14 Modify CBI as Needed — 4.10		
D Planning & Organizing the Vocational Education Learning Environment for CBI — 3.97	D.1 Develop a Plan to Implement CBI in Vocational Education Learning Environments — 4.11	D.2 Schedule CBI Activities — 3.97	D.3 Project Resource Needs (Supplies, Materials, Equipment) for CBI — 4.02	D.4 Provide Microcomputer Maintenance — 3.69	D.5 Establish Microcomputer User Security — 3.72	D.6 Establish Microcomputer Hardware/Software Security — 3.84	D.7 Create Authorized Back-up Copies of Microcomputer Software — 4.40	
E Performing Classroom Management Functions with CBI — 3.74	E.1 Determine Classroom Management Activities to be Performed with CBI — 4.13	E.2 Select Software for Classroom Management Activities — 4.28	E.3 Prepare Software for Classroom Management Activities — 3.57	E.4 Maintain Classroom Rosters — 3.44	E.5 Maintain Attendance Records — 3.39	E.6 Generate Tests — 3.83	E.7 Score Tests — 3.53	E.8 Record Grades or Performance Progress — 3.88
Performing Classroom Management Functions with CBI (Con't)	E.9 Maintain Inventory of Teaching Supplies, Materials & Equipment — 3.91	E.10 Manage Vocational Student Organizations — 3.49						

Competency Rating Scale

The relative importance of these 47 competencies was determined by surveying a national sample of 134 vocational educators. Vocational instructors included in this sample were identified as experts at applying microcomputers in their programs by their respective state supervisors. Ninety-seven (97) vocational teachers (72%) responded to this survey. The following vocational disciplines were represented by this sample: agriculture; business; home economics; marketing and distribution; trade and industrial; and health occupations education. Mean ($\bar{x}$) competency ratings were derived from respondents' ratings based on the following scale:

1 = No Importance 2 = Minimal Importance 3 = Average Importance 4 = High Importance 5 = Extreme Importance

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Table 2

Number and Percentage of Respondents from each Vocational Program Area and the Original DACUM Panel

Program Area	Group Code n	Total Surveyed	Number of Respondents	Percentage of Respondents
Agriculture	1	38	32	84%
Business	2	23	15	65%
Home Economics	3	16	11	69%
Marketing & Distribution	4	31	20	64%
Trade & Industrial	5	17	12	70%
Health	6	9	7	78%
Sub-Total		134	97	72%
DACUM Panel	7	12	11	92%
Total		146	108	74%

Table 3

Oneway ANOVA Applied to the Importance Ratings of the Total Sample for Competencies A.2, B.4, C.2, C.9, and C.12

Source	df	SS	MS	F ratio	Probability
Competency A.2					
Between Groups	6	14.16	2.36	2.68	.0185
Within Groups	101	88.83	.88		
Total	107	102.99			
Competency B.4					
Between Groups	6	9.02	1.50	2.51	.0264
Within Groups	101	60.50	.60		
Total	107	69.52			
Competency C.2					
Between Groups	6	8.88	1.48	2.31	.0396
Within Groups	101	64.78	.64		
Total	107	73.66			

Table 3

(continued)

Competency C.9					
Source	df	SS	MS	F ratio	Probability
Between Groups	6	8.85	1.48	2.49	.0273
Within Groups	101	59.81	.59		
Total	107	68.67			

Competency C.12					
Between Groups	6	10.14	1.69	2.28	.0415
Within Groups	101	74.77	.74		
Total	107	84.92			

Table 4

Competencies on which the Groups Differed and the Group Means and Standard Deviations

Competency Code n	Competency Statement		Group Code n 1	2	3	4	5	6	7
A.2	Define the Vocational Instructor's Role in the LEA Plan for CBI	M	3.56	4.33	3.82	4.15	4.17	4.86	3.91
		SD	.98	.90	.98	.87	1.19	.38	.83
B.4	Demonstrate an Awareness of Microcomputer Software for Developing Computer Based Vocational Curricula	M	4.28	4.40	4.64	4.15	3.50	4.29	4.09
		SD	.63	.74	.67	.81	1.09	.95	.70
C.2	Assess Students' Needs for Specific CBI Applications	M	4.00	4.40	4.09	4.30	3.67	4.86	4.36
		SD	.72	.63	1.04	.73	1.15	.38	.81
C.9	Orient Students to CBI	M	4.56	4.53	4.36	4.65	3.67	4.43	4.54
		SD	.76	.64	.81	.67	.98	.79	.82
C.12	Assess Student Microcomputer Skills	M	3.97	4.27	3.82	4.40	3.33	4.14	4.09
		SD	.86	.80	.87	.82	1.07	.69	.83

Table 5

T-tests for Pairs of Groups that Differed Significantly on Competencies A.2, B.4, C.2, C.9, and C.12

Source	df	t value	2-Tail Probability
Competency A.2			
Groups 1 & 2	45	-2.57	.013
Groups 1 & 4	50	-2.19	.033
Groups 1 & 6	37	-3.40	.002
Groups 3 & 6	16	-2.65	.017
Groups 6 & 7	16	2.81	.012
Competency B.4			
Groups 1 & 5	42	2.96	.005
Groups 2 & 5	25	2.56	.017
Groups 3 & 5	21	2.98	.007
Competency C.2			
Groups 1 & 6	37	-3.04	.004
Groups 2 & 5	25	2.10	.046
Groups 5 & 6	17	-2.62	.018
Competency C.9			
Groups 1 & 5	42	3.21	.003
Groups 2 & 5	25	2.76	.001
Groups 4 & 5	30	3.36	.002
Groups 5 & 7	21	-2.31	.031

Table 5

(continued)

	Competency C.12		
	df	t value	2-Tail Probability
Groups 1 & 5	42	2.04	.048
Groups 2 & 5	25	2.59	.016
Groups 4 & 5	30	3.17	.003

Table 6

Groups that Differed Significantly on T-tests on Competencies A.2, B.4, C.2, C.9, and C.12

Competency Code n	Groups by Code n that Differed on T-tests	Total Number of Group Differences on Competency
A.2	4 2 6 6 6 1 1 1 3 7	5
B.4	1 2 3 5 5 5	3
C.2	2 6 6 5 1 5	3
C.9	2 7 1 4 5 5 5 5	4
C.12	1 2 4 5 5 5	3

Note: The position of group code numbers reflect the magnitude of importance associated with each competency. Group numbers on the top represent higher mean importance ratings than the group numbers on the bottom.